Study of ocular morbidities in heavy smokers attending eye OPD of a tertiary care centre of central India

Priti Singh[1,*], Akhil Tanwar[2]

[1]Assistant Professor, [2]Resident Medical Officer, Dept. of Ophthalmology, [1]Gandhi Medical College, Bhopal, Madhya Pradesh, [2]Government Medical College, Amritsar, Punjab, India

***Corresponding Author: Priti Singh**
Email: singh_priti2178@yahoo.com

Abstract

Tobacco smoke contains a myriad of toxic chemicals. Smokers have been implicated to be at a higher risk of developing dry eye, cataracts, glaucoma, amblyopia, ARMD and diabetic retinopathy. In addition to this, many smokers are not aware of the adverse effects of smoking on the eye. A survey carried out in 2013 in the UK found that just 15% of smokers are concerned about the impact smoking has on their eye health.

Aims: To find out the incidence, prevalence, status of ocular disease among heavy smokers and to know the awareness level among heavy smokers. Also to find out relation between ocular problems and systemic diseases in subjects.

Setting: The study was carried out in patients attending eye OPD of a tertiary care centre during July and August 2015.This is a cross-sectional study.

Materials and Methods: Clinical examination was conducted starting with the torch light examination and conjunctiva, cornea, lens, anterior segment were evaluated. This was followed by visual acuity assessment using snellens chart. Furthermore, Slit Lamp Biomicroscope was used in case of suspicious cases to add to our findings. Dry eye evaluation was done using Schirmer test strips. Lastly Direct Ophthalmoscopy was performed to look at the fundal changes. Appropriate statistical formulas were used.

Results: The prevalence of Dry eye was 74.28%. The finding of dry eye in males and females was not significant at p value <0.05. In our study 35% of the patients were aware of the ill effects that smoking has on the eyes. Lens finding in the subjects in our study was present in 26 cases and their subtypes were: Nuclear Cataract – 16, Mature cortical Cataract – 4, Immature Cortical Cataract - 6.

Conclusion: We were able to quantify different ocular morbidities of which Dry eye was the most prevalent. Findings of cataract, ARMD and diabetic retinopathy were also present in some patients. We were also able to quantify findings of dry eye in males and females; however the difference was statistically insignificant. Our study also shed some light on various other associated systemic findings present in the patients in addition to the eye problems.

Keywords: ARMD, Cataract, Diabetic retinopathy, Ocular morbitdity, Smokers.

Introduction

Tobacco smoke is composed of at least 7000 active chemicals, most of them toxic and potentially damaging to the eye. Ongoing exposure to tobacco smoke generates biological changes in the eye that can lead to various ocular morbidities like dry eye syndrome, Cataracts, Glaucoma, worsening of Diabetic Retinopathy, ARMD, and Tobacco amblyopia. This can result in discomfort and visual disturbances with potential for permanent blindness.[1]

Oxidative damage plays a major role in cataract genesis and cigarette smoking is believed to confer increased risk of cataract, at least in part which is very well established by the observational evidence which site that heavy smokers have many fold times increased risk of cataract (nuclear & posterior sub capsular) as well as mixed opacities to that of non-smokers.[2,3]

Heavy smokers have up to three times the risk of cataract as non-smokers.[4] A Smoker's risk of developing cataract increases with the amount smoked. Moreover research suggests that cigarette smoke related tar, triggers the formation of deposits in the retina (drusens) which mark the start of macular degeneration.[5]

Smoking causes morphologic and functional changes to the lens and retina due to its atherosclerotic and thrombotic effects on the ocular capillaries. Damage to the lens is related to any form of smoke and partially pyrolyzed organic materials from tobacco, some earlier studies suggests the major damaging mechanism to be oxidative stress brought about by reactive oxygen species (ROS) generated by smoke constituents both in dark and in light.[6,7]

Studies show smokers can have a threefold increase in the risk of developing ARMD compared with people who have never smoked. In addition to this, female smokers over 80 years of age are 5.5 times more likely to develop ARMD than non-smokers of the same age.[8]

Tobacco amblyopia occurs when blood vessels constrict and circulation is lessened resulting in optic neuritis or swelling of the optic nerve. This swelling may lead to damage of the optic nerve. At first there may be blurring or some loss of central vision. If unchecked, blurring may spread to the peripheral field. This progressive atrophy of the optic nerve causes loss of central and color vision.[9]

Rationale behind carrying out this study is to basically find out the prevalence of ocular disease burden in the smokers and providing them with correct treatment to reduce any complications.[10]

A survey carried out in 2013 in the UK found that just 15% of smokers are concerned about the impact smoking has on their eye health.[11] This is likely because public awareness about the risk of eye diseases associated with smoking is very low. Mass media campaigns in Australia and New Zealand have been very successful in raising

awareness about the risk of eye diseases associated with smoking.[1]

We decided on this particular topic as there are still gaps in the knowledge regarding harmful effects of the smoke on the eyes. And with this study we hope to increase awareness and provide data on which future treatment modalities can be based on. Adverse effects of smoking must be stressed to the younger age groups which are more prone for addictions as majority start at an early age.

Materials and Methods

The study was carried out during July and August 2015 in people coming to the eye OPD in hospital who smoke. They were included in the study randomly and their ocular status was ascertained. This was a cross-sectional study.

Informed consent was taken from the respective patients and proper approval from the ethical committee was obtained.

A strict inclusion and exclusion criteria was followed:

Exclusion Criteria:

1. Contact lens users
2. Infective keratitis
3. History of ocular surgery in past 6 months
4. Those with allergic diseases
5. On antihistamines or atropine or similar drugs
6. People working in chemical industries
7. Ex-smokers – those who stopped >2 months prior to study period

Inclusion Criteria:

1. Smokers (people smoking 10 cigarettes (1½ pack)/day or a bundle of bidi per day)
2. People 18-50 years of age (of same degree of social and environmental status)

All the included people were subjected to a Questionnaire specifically dealing with the history of smoking.

Questionnaire / Case Record Form (specifically dealing with history of smoking)

1. Name, age, sex
2. Socio economic status
3. Education
4. Income
5. Occupation
6. Allergic history
7. Smoking history
8. Type of smoke use
   i. Bidi
   ii. Cigarette
   iii. Chillum (clay pipe)
   iv. Chutta (reverse smoking)
   v. Hukkah (hubble bubble)
   b. Duration
   c. Amount smoked in a day/week/year
9. Other addictions
10. Past history
    a. Any eye diseases
    b. History of DM, HTN
11. Surgical history

Clinical examination was conducted starting with the torch light examination and conjunctiva, cornea, lens, anterior segment were evaluated. This was followed by visual acuity assessment using Snellens chart.

Furthermore, Slit Lamp Biomicroscope was used in case of suspicious cases to add to our findings. Dry eye evaluation was done using Schirmer test strips. Lastly Direct Ophthalmoscopy was performed to look at the fundus changes.

Random Blood Glucose was assessed using glucose strips and Blood Pressure measurements were taken using a sphygmomanometer. A blood sample was also collected to look for lipid levels including total Cholesterol and LDL levels. All these tests were used to look for any systemic problems in the patients and the values provided by the lab were used. The results were statistically analysed using appropriate statistical formulas.

Result

Results were made from a total of 105 patients and all the patients had some type of ocular pathology and only 78 patients (i.e. 74.28%) presented with some degree of dry eye and their relative subtypes were:

Table 1

Dry Eye	No. of Patients	% of Patients
Mild	26	33.33
Moderate	22	28.20
Severe	30	38.46

Prevalence of Dry eye in males and females in the study group:

Table 2

	Males	Females	Marginal Row Totals
Dry Eye	63	15	78
No Dry eye	20	7	27
Marginal Column Totals	83	22	105 (Grand Total)

The Chi-square statistic is 0.5428. The P value is 0.46126. This result is *not* significant at $p < 0.05$.

The relation of dry eye with the duration of smoking was as follows:

Table 3

Duration of smoking (years)	No Dry eye	Mild dry eye	Moderate dry eye	Severe dry eye
0-5 years	16	0	0	0
6-10 years	6	2	2	0
11-15 years	2	12	8	6
16-20 years	0	6	6	8
21-25 years	0	4	4	2
26- 30 years	0	2	2	6
>31 years	2	0	0	9

In the test subjects the different type of Tobacco used was as follows:

Table 4

	Bidi	Cigarette	Both Bidi and Cigarette	Chutta (reverse smoking)	Hukkah	Chillum (clay pipe)
Type of Tobacco used	83	5	12	0	3	2

Lens findings in the subjects was as follows:

Table 5

Lens Findings	
No Lens findings	79
Immature Cortical Cataract	6
Mature Cortical Cataract	4
Nuclear Cataract	16

1. The awareness level about the ill effects of smoking on the eye in the test subjects was:

a. 37 subjects were aware and 68 subjects were not aware about how smoking affects their eyes.

2. Fundal findings were present in 21 cases in our study and their further subtypes was as follows:

a. Diabetic Retinopathy (in Diabetics) - 3
b. ARMD - 6
c. Papilledema and Optic Atrophy - 4
d. Chorioretinal Degeneration - 8

Associated systemic manifestations in the study patients were:

Table 6

Associated Systemic findings	
Diabetes Mellitus	19
Chronic Bronchitis	33
Hypertension	16
Dyslipidemia	8
No additional systemic findings	24
Diabetes and Hypertension	5

Discussion

The present study was undertaken in the light of the available literature to evaluate ocular morbidities in heavy smokers attending eye OPD of a tertiary care centre in central India.

In this study a total of 105 cases were examined.

In the current study, 74.28% of cases had signs and symptoms of dry eye and a study "ocular morbidity due to dry eye and its awareness among smokers in a Medical College Hospital in

South India", done in Mangalore showed that 85% of cases had symptoms of dry eye.[20] The result is quite similar to our study.

This study showed that 35% of the cases were aware of the fact that smoking has adverse effects on the eyes which is similar to the results obtained by a study done in Singapore, "Awareness of blindness and other smoking-related diseases and its impact on motivation for smoking cessation in eye patients" wherein they got 42.5 awareness status.[16] This could've been because of better educational status in Singapore.

Another study done in Mangalore showed an awareness status of 31%, which is also quite similar to our results.[20]

In our study we concluded that Lens findings were positive in 25% of the cases.

This included:

Nuclear Cataract – 16%

Cortical Cataract – 10%

A Study done in Andhra Pradhesh by Krishnaiah et al (2005) showed prevalence of Nuclear Cataract (6.3%) and cortical cataract (3.0%).[22]

Another study done in Melbourne, Australia showed that nuclear cataract (RR= 2.2) was more prevalent than Cortical cataract (RR= 0.8).[23]

In the current study the prevalance of dry eye in males and females was 80.8% and 19.2% respectively. Whereas a study done in Mangalore by Safar et al, showed a prevalence of 92.5% in males and 7.5% in females.[20]

The result differs probably because they had a much larger sample size as compared to ours.

In our study the prevalence of chronic bronchitis associated with smoking was 31.4% and in the study done in University of Kuopio, Finland was 42%. The result differs probably because the sample size taken in the other study was 1,711 and it the current study was only 105 cases.[19] And there may been other environmental factors that could have contributed to prevalence of chronic bronchitis.

In this current study the prevalence of hypertension in smokers was 21% which differs significantly from the study done in Dehradun, Uttrakhand, India which showed a prevalence of 41%. Maybe environmental, occupational and dietary factors were the reasons for the disparity in the findings.[18]

Our study showed a 14.3% prevalence of diabetic retinopathy in diabetics. Whereas a study done in Chennai, India showed a 18% prevalence which is quite similar to our finding.[21]

Conclusion

We were able to quantify different ocular morbidities of which Dry eye was the most prevalent. Findings of cataract, ARMD and diabetic retinopathy were also present in some patients. We were also able to quantify findings of dry eye in males and females; however the difference was statistically insignificant.

Our study also shed some light on various other associated systemic findings present in the patients in addition to the eye problems. Further research is needed in this area to elucidate the effects of smoke in children of smokers and/or close relatives of the smoker. Studies can also be conducted to reveal any protective role of a good diet or vitamin supplements on the eye status in current smokers.

These findings provide an opportunity for the public health and eye health communities to work actively to educate the public about the impacts of smoking on eye health. Such education will improve quit rates and help to discourage people from starting to smoke.

Government should imply a plan to create an awareness campaign in regard to eye health. Nicotine based de addition alternatives should be provided to help control morbidity and mortality associated with smoking and tobacco use. Measures that are already ongoing should be supervised with strict control. Legislative programs such as National Tobacco Control Program should be kept under continuous surveillance and monitoring to have effective impact on raising public awareness and promote behavioral change. School programs should also be implemented to encourage youngsters to stay away from smoking as these habits are established at a very young age.

Conflict of Interest: None.

References

1. Royal National Institute of Blind People (RNIB). Save our Sight.
2. Hiller R, Sperduto RD, Podgor MJ. Cigarette Smoking and risk of Nuclear Cataracts. *Arch Ophthalmol* 1987;107:1166-1169
3. Hankinson S, Willett W, Colditz G, Seddon J, Rosner B, Speizer F. A prospective study of cigarette smoking and risk of cataract surgery in women. *J Saf Res* 1993;24(2):129.
4. Smoking can lead to vision loss or Blindness. Department of Health (Information for a healthy New York)
5. Macularsociety.org. Macular Society | About macular conditions | Smoking and macular degeneration [Internet]. 2015 [cited 8 January 2015]. Available from: http://www.macularsociety.org/about-macular-conditions/smoking-and-macular-degeneration
6. Mishra VK, Retherford RD, Smith KR; BiomassCooking Fuels and Prevalence of Blindness in India. *J Environ Med* 1999;1:189–199.
7. Krishnaiah S, Vilas K, Shamanna B, Rao G, Thomas R, Balasubramanian D. Smoking and Its Association with Cataract: Results of the Andhra Pradesh Eye Disease Study from India. *Invest Opthalmol Vis Sci* 2005;46(1):58.
8. Surtenich A. How Smoking Harms Your Vision. 1st ed. San Diego; 2015.
9. A. Olive. Tobacco amblyopia | opticalview360 [Internet]. Opticalview360.wordpress.com. 2014 [cited 5 September 2015]. Available from: https://opticalview360.wordpress.com/tag/tobacco-amblyopia/
10. Sihota R, Tandon R. Systemic Ophthalmology. In: Sihota R, Tandon R, editors. Parson's Diseases of the Eye, 21st ed. New Delhi: Elsevier; 11.p.522.
11. OpticianOnline.net. Most Smokers unaware of eye health risk. Optician, December 13, 2013.
12. Bidwell G, Sahu A, Edwards R, Harrison R, Thornton J, Kelly S. Perceptions of blindness related to smoking: a hospital-based cross-sectional study. *Eye* 2005;19(9):945-948.
13. Thomas J. The effect of smoking on the ocular surface and the precorneal tear film. *Australas Med J* 2012;5(4):221-226.
14. Moss S, Klein R, Klein B. Association of Cigarette Smoking With Diabetic Retinopathy. *Diabetes Care* 1991;14(2):119-126.
15. Wilson GA e. Smoke gets in your eyes: smoking and visual impairment in New Zealand. - PubMed - NCBI [Internet]. Ncbi.nlm.nih.gov. 2015 [cited 26 September 2015]. Available from: http://www.ncbi.nlm.nih.gov/pubmed/11760242
16. Handa S, Woo J, Wagle A, Htoon H, Au Eong K. Awareness of blindness and other smoking-related diseases and its impact on motivation for smoking cessation in eye patients. *Eye* 2011;25(9):1170-1176.
17. Foy C, Bell R, Farmer D, Goff D, Wagenknecht L. Smoking and Incidence of Diabetes among U.S. Adults: Findings from the Insulin Resistance Atherosclerosis Study. *Diabetes Care* 2005;28(10):2501-2507.
18. Mittal Y. Prevalence of hypertension among rural population of Doiwala block, Dehradun, Uttarakhand India. 1st ed. Dehradun: Recent Research in Science and Technology; 2013.
19. Pelkonen M. Thirty-Year Cumulative Incidence of Chronic Bronchitis and COPD in Relation to 30-Year Pulmonary Function and 40-Year Mortality. *Chest* 2006;130(4):1129.
20. Safar S, Jain R, Hegde V, Bappal A. Ocular Morbidity Due to Dry Eye and its Awareness among Smokers in a Medical College Hospital, South India. *Int J Sci Stud* 2015;3(1):9-13.
21. Raman R, Rani P, Reddi Rachepalle S, Gnanamoorthy P, Uthra S, Kumaramanickavel G et al. Prevalence of Diabetic Retinopathy in India. *Ophthalmol* 2009;116(2):311-318.
22. Krishnaiah S, Vilas K, Shamanna B, Rao G, Thomas R, Balasubramanian D. Smoking and Its Association with Cataract: Results of the Andhra Pradesh Eye Disease Study from India. *Invest Opthalmol Vis Sci* 2005;46(1):58.
23. Mukesh BN. Development of cataract and associated risk factors: the Visual Impairment Project. - PubMed - NCBI [Internet]. Ncbi.nlm.nih.gov. 2015 [cited 26 September 2015]. Available from: http://www.ncbi.nlm.nih.gov/pubmed/16401788

How to cite this article: Singh P, Tanwar A. Study of ocular morbidities in heavy smokers attending eye OPD of a tertiary care centre of central India. *Indian J Clin Exp Ophthalmol* 2019;5(1):87-90.